Before The
Federal Communications Division
Washington, D.C. 20554

In the Matter of:		
Digital Audio Broadcasting Systems		
And Their Impact on Existing Analog		MM Docket No. 99-325
Radio Broadcast Services		

To The Commission:

COMMENTS OF DOUG DINGUS

As a radio listening member of the American Public, I feel compelled to submit the following comments and concerns about the AM In Band On Channel (IBOC) Digital Radio Broadcast system:

1. **The IBOC system, as developed by Ibiquity Incorporated for use on the AM broadcast band, causes significant noise and interference audible on a significant portion of existing AM radio receivers.**

Daytime AM IBOC testing is in process in my city of residence, thus giving me an ample opportunity to evaluate the many claims of noise and interference made by opponents of AM IBOC.[1] While not scientific in nature, I have noted the following, noise and interference related, artifacts on a sampling of ordinary analog radios. The sample set ranges from recent vintage high-quality radios to somewhat dated ordinary radios.

On all but one radio, a constant 'hiss' sound can be heard during the day, when the IBOC system is in use. In general, the better the radio, the worse this hissing noise is. While not loud enough to drown out programming, I do find listening for extended periods frustrating in its presence.

Sibilant sounds, being those sounds with a significant noise content, are often over-emphasised with the result sounding much like a lisp instead of the clearly articulated “s” or “th” sound expected, for example.

Overall audio quality is reduced with a “muddy” sound.

For those radios with more advanced functionality, the “seek” and or “scan” functions do not correctly locate the analog audio program when IBOC is in use. Prior to the introduction of the IBOC system, these functions would locate moderate to strong channels with a high degree of reliability. With IBOC, the overall utility of these functions is sharply reduced because the new IBOC signals are strong enough to generate false positives, thus causing an analog receiver so equipped to tune noise instead of the radio station the listener is accustomed to.

2. The AM IBOC digital audio reproduction is sub-par compared to analog means and methods.

While the high cost of a digital radio receiver lies beyond my means, I have been able to obtain reliable audio samples from others who do possess these new receivers.[2] A strength of the IBOC AM system appears to be reduced noise and improved frequency response[3] however, these strengths appear to come at the cost of overall audio quality in general. I personally find many of these trade offs less than acceptable given the robust performance our existing analog service technologies deliver on a daily basis. It is my belief a significant percentage of the listening public will share my opinion of the overall audio performance.[4]

Digital audio compression performance limits are well established with the advent of the Internet and the deployment of real world digital streaming media delivery technologies today. Sadly, the peak AM IBOC bit rate is about half that necessary for FM quality audio to be delivered to the radio listener. (~36Kbps)

The low bit rate mandates the use of a partial compression scheme where only the lower, significant frequencies are actually encoded for transmission, leaving the higher frequencies to be approximated at the receiver. This fact alone casts the "FM quality audio" claim into a questionable light. The quality/bandwidth issues alone would not be enough to discount the technology, however the low-bit rate also degrades the lower frequencies too.

The samples I evaluated contained, clearly audible slur, as if the radio were under water or moving. This type of artifact is particularly audible when listening to the spoken word over IBOC enabled receivers. Given the popularity of AM talk radio programming, it's not safe to assume the general public will be happy with the audio quality trade offs enforced by the use of IBOC on AM.

3. There is no clear evidence that shows the American public is unhappy with the quality of their radios today.[5]

There is no doubt that AM radio is the least capable broadcast method. There is also no doubt regarding the superior fidelity digital transmission is capable of, given sufficient bandwidth to accommodate the necessary bit rate to achieve said quality. However, AM IBOC does not provide enough bandwidth to achieve this goal. As detailed above, digital transmission even in the all digital mode where we have no analog signal present, will still be riddled with audio artifacts that render it inferior to solid analog methods in all areas but overall signal to noise. This reduces the overall IBOC value proposition significantly in that new radio receivers will have to be purchased to replace existing analog ones with no assurance of a better listening experience.

If the public is largely happy with the quality of their existing radios, and the quality embodied in the IBOC technology is marginal, what incentive do they have to purchase new radios besides the artificial incentive put into place by the IBOC technology itself?

4. Investment in expensive AM IBOC infrastructure is likely more costly than similar investment in analog methods.

Replacing all existing analog radio receivers, with new digital ones will be expensive for the American public and wasteful as we consume precious natural resources with no assurance the resulting radio environment will provide substantive returns. Given this waste and cost to the American public, I do not support AM IBOC, in any form, without though public evaluation and testing of the technology. To do otherwise is a costly and expensive risk to both the public and the radio industry that is irresponsible,

without due consideration.

5. Present day technology suggests solid alternatives that have yet to be explored.[5]

Analog AM radio has two primary problems, namely: audio frequency response and noise. If we are to begin to make better radio receivers, we should consider the combination of analog and digital technologies in order to preserve, as much as is possible, of our existing investment in AM radio.

Impulse noise blanking is a simple and cost-effective method of reducing analog noise that is both time tested and prove n to have no ill-effect on other radios or the program content being broadcast to the listener. This technology is robust and can be incorporated into an AM radio receiver design with little overall cost impact.

Digital Signal Processing (DSP) technology may also serve to significantly improve AM radio audio reproduction through aggressive and specialized filters and other processing. Much of the necessary development exists today, yet remains on the shelf in lieu of an expensive, and unproven IBOC digital system.

6. Rapid implementation of AM IBOC may cause more public harm than it does good.

As noted above, the quality issues with AM IBOC are significant.[4] Many, if not all these issues will not be resolved with simple power-level or broadcast time limitations. Bandwidth is key to providing quality digital audio and AM IBOC simply cannot deliver enough of it, as proposed, without significant negative impact on existing analog service levels. This combined with the resulting audio "quality" improvements, likely to be perceived in a negative way by a significant percentage of he listening public, provides little solid justification for continued AM IBOC in its current form.

I see no reason why we cannot go forward with FM IBOC while working hard to address AM radio quality issues on a separate path that may or may not eventually lead to digital service as the potential FM risks are considerably lower than those for AM.

7. Mutual cooperation of everyone involved in AM radio broadcasting primary key to improvement on a quality basis.

Several of the comments published here imply the Ibiquity system will push smaller broadcasters from the marketplace. First, second and possibly third adjacent channel interference, implementation cost and annual licenses are some of the reasons given. With these things in mind, I pose a question to the commission that deserves consideration and additional study:

Is it less expensive to make frequency allocation, channel spacing changes (10 to 20Khz) over a period of, say 10 years, aimed at allowing wider bandwidth signals and reduction of adjacent channel interference than it is to implement IBOC as currently planned?

Put simply, are we really doing the right thing for AM in the long term? What if the IBOC system fails to capture significant public support? Is that risk worth the high implementation costs and annual licenses required for broadcast using the IBOC system?

Doubling the channel allocation, will cut the number of AM frequencies roughly in half.

However, those remaining channels would be capable of high-quality stereo analog transmissions that leverage existing receivers and provide programming as an incentive to produce new, high quality receivers using some of the technology alternatives suggested above without having to degrade the service quality the public is accustomed to, nor their receivers.

8. The Ibiquity audio codec is proprietary technology.

Why are we not exploring open and free audio compression alternatives in order to reduce the overall license cost for both radio receivers and broadcast stations? Is granting monopoly status to Ibiquity corporation in our collective best interests when open technologies, such as Ogg-Vorbis and MPEG-4 remain viable options. I realize this particular point is rendered moot by my points above, but it is relevant to both FM IBOC and AM IBOC, thus it appears here.

Summary

AM IBOC remains an unproven and expensive broadcast methodology with a dubious value proposition and marginal potential for return on investment for both the listening radio public and the broadcast industry as a whole. Before embarking on a path, with high potential to degrade existing radio service quality expectations, thorough and unbiased public evaluation of the all avaliable AM broadcast technology solutions must be performed if we are to insure long-term success in the goal of actually improving the overall radio listening experience for everyone involved.

It is clear that IBOC is not the only solution available to us, nor is it an all inclusive solution, for improving the AM radio listening experience. Opting to go forward with AM IBOC at this time could disrupt many years of quality AM service without a solid assurance such disruption will meet the needs of radio listeners.

Respectfully Submitted,

Doug Dingus
9812 Ne Wygant St.
Portland, Oregon 97220
doug@opengeek.org
http://www.opengeek.org

Dated: July, 13 2005

REFERENCES:

1. **1190 KEX First Portland HD AM IBOC Station**

   http://beradio.com/iboc_update/iboc_update_062205/

2. **Various audio samples, including IBOC audio samples from Ibiquity Corporation:**

   http://www.opengeek.org/2005/03/hd-radio-analog-fm-mp3-and-ogg-audio.html/

3. **Wikipedia IBOC reference entry**

   http://en.wikipedia.org/wiki/In-band_on-channel

4. **"The Trouble With IBOC"**

   http://beradio.com/departments/radio_troubles_iboc/

5. ***"A Comparative Overview of Digital Audio Broadcasting (DAB) Systems and Their Compatibility With The American Broadcast Landscape"***

   http://www.recnet.com/dab/